Fertility Awareness and Pregnancy Intentions

Analysis of Demographic and Health Surveys in Six Countries

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Executive Summary

Fertility awareness is the basic knowledge of a woman's menstrual cycle and includes information about when and how pregnancy occurs, and the likelihood of pregnancy from unprotected intercourse at different times during the menstrual cycle and at different life stages. When understood correctly, this information can be applied to reduce unintended pregnancies. Without this information, women and men are less likely to accurately assess a woman's risk of pregnancy, which has the potential to influence their decisions around family planning use. Limited research is available on the benefits of fertility awareness for couples through various stages of the life cycle. This study aimed to fill this gap by exploring the interrelationship between fertility awareness and unintended pregnancy, and to understand the characteristics of women who recognize the fertile period in their fertility cycle.

We used Demographic and Health (DHS) data to answer the following research question: Are women who know that unprotected intercourse during the fertile period can lead to pregnancy, less likely to have an unintended pregnancy? DHS surveys are cross-sectional surveys that use stratified, multistage sampling strategies and are representative at the national level. For this analysis, we chose to use the surveys from six countries: Azerbaijan (2006), Bolivia (2008), Cameroon (2011), Democratic Republic of the Congo (DRC, 2007), Morocco (2003), and the Philippines (2008). These countries were selected because they met the following criteria: (1) relatively high knowledge of the fertile period during the fertility cycle; (2) a recent DHS survey conducted after 2000; (3) indicators of interest were collected in the survey and were available in the dataset; and (4) a range of countries representing different regions around the world.

The DHS survey asks respondents if there are certain days when they are more likely to become pregnant between two menstrual periods. If a respondent agrees with this statement, then they are asked when these days occur. We operationalized fertility awareness as those who answered 'yes' to the first question and 'half way between two periods' to the second question. Our key outcome measures were: 1) fertility awareness, and 2) intentions of current or last pregnancy. Unintended pregnancy was defined as an unwanted or mistimed pregnancy. We assessed bivariate associations between fertility awareness, respondent characteristics, and intention of current or last pregnancy, excluding women whose last pregnancy was over a year ago. Multivariate logistic regression models were used to estimate the relationships between explanatory covariates (age, number of living children, educational attainment, wealth quintile and residence) and the dichotomous outcome variables. Odds ratios (OR), 95% confidence intervals (CI), and p-values were calculated. The analysis was restricted to married women of reproductive age who are currently pregnant or were pregnant in the 12 months preceding the survey, to reduce temporal and recall biases. The sample sizes are 766 in Azerbaijan, 2397 in Bolivia, 3654 in Cameroon, 2860 in DRC, 1876 in Morocco, and 1909 in the Philippines.

The bivariate analysis demonstrates that correct knowledge of the fertile period in the fertility cycle is associated with older women, fewer children, higher education, and urban residence. In terms of

pregnancy intentions, older women, women with more children, lower education, and lower wealth are more likely to have not intended their last pregnancy.

Multivariate logistic regression models assessed the relationships between: 1) fertility awareness and demographic covariates; 2) unintended pregnancy and demographic covariates; and 3) fertility awareness and unintended pregnancy, net of demographic covariates. Women with fertility awareness were less likely to have an unintended pregnancy in Azerbaijan, Bolivia Cameroon, and the Philippines. This association was statistically significant only in Cameroon where women with fertility awareness were 29% (OR: 0.71; p-value<0.00) less likely to have an unintended pregnancy. The opposite relationship was observed in the DRC and Morocco where women with fertility awareness were more likely to have an unintended pregnancy. This relationship statistically significant in Morocco (OR: 1.38; p-value<0.05).

We observed the expected direction of the association in four of the six countries where fertility awareness predicted fewer unintended pregnancies, net of demographic characteristics. This relationship was statistically significant in only one country. Possible explanations for why this result was not significant in more countries could be that the measure we used for fertility awareness is crude, may not adequately capture correct knowledge of when woman are most likely to become pregnant, and does not explore how this information is internalized and applied to a woman's own life. In addition, even with correct fertility awareness, there are other factors that may influence a woman's ability to translate this knowledge into behaviors. For example, a lack of access to modern contraceptive methods or support for contraceptive use from husbands and others in their social networks may influence a woman's decision to use (or not use) a family planning method. In other instances, a woman might not have the power within a relationship to use condoms during her fertile period. Further research is needed to better understand the links between fertility awareness and the use of family planning.

Introduction

Fertility awareness comprises information about a variety of subjects that can influence sexual and reproductive health, including body changes during puberty and on-set of fertility, postpartum return to fertility, pregnancy risk at various life stages, and fertility risk during the menstrual cycle. At its most basic definition, it means the basic knowledge of when during her cycle a woman can become pregnant if she has unprotected intercourse. This information allows couples to plan or avoid future pregnancies. The Institute for Reproductive Health, Georgetown University has identified a gap in the research literature exploring the benefits of fertility awareness for couples through various stages of the life cycle. This report presents results of a study designed to explore the characteristics of women who are aware of the fertile period during the menstrual cycle, and explore links between fertility awareness and having unintended pregnancies, using the Demographic and Health Surveys (DHS) data from six counties.

Methodology

1. Data

The study uses data from the DHS, which are cross-sectional surveys that use a stratified, multistage sampling strategy and are nationally representative for each country. Data are collected through a standardized questionnaire in all countries. A loose definition for fertility awareness is available in the data. First, respondents are asked: "From one menstrual period to the next, are there certain days when a woman is more likely to become pregnant?" Respondents who answer in the affirmative, are then asked "Is this time just before her period begins, during her period, right after her period has ended, or halfway between two periods?" We define having fertility awareness as responding "halfway between two periods" to this second question. We recognize that this response does not indicate that the woman has accurate information about her fertile time as simply knowing that pregnancy is more likely mid-cycle is insufficient for avoiding unintended pregnancy. Nevertheless, it provides some insight into this issue.

Table 1: Weighted Distribution of Fertility Awareness among Married women of reproductive age

	Fertility Awareness	
	%	n
Azerbaijan (2006)	40.0	5269
Bolivia (2008)	40.8	10162
Cameroon (2011)	30.9	9792
DRC (2007)	41.5	6611
Morocco (2003)	40.3	8761
Philippines (2008)	37.4	8418

We selected countries for inclusion in this analysis if they met the following criteria: (1) relatively high rates of fertility awareness using this definition (Table 1); (2) a recent DHS survey conducted after 2000; (3) indicators of interest were collected in the survey and included in the publicly available data set; and (4) a range of countries representing different regions around the world. Six countries met these criteria (year of data collection in parentheses): Azerbaijan (2006), Bolivia (2008), Cameroon (2011), Democratic Republic of Congo (DRC) (2007), Morocco (2003), and the Philippines (2008). The analysis is restricted to currently married women of reproductive age (15-49 years old) who are currently pregnant or were pregnant in the 12 months preceding the survey. We restrict the analysis in this way to reduce any bias associated with variable sequencing in time.

2. Dependent Variables

There are two key outcome measures of interest in the analysis. The first, fertility awareness, is a dichotomous variable of women who know that the middle of their cycle is the fertile period versus women who do not know. Women classified without fertility awareness are those who reported that ovulation occurs during the menstrual cycle, after the menstrual cycle, before the menstrual cycle, at any time, other responses or don't know, or who did not know that there is a fertile time in the cycle. The second outcome measure is intention of the last pregnancy or current pregnancy.

Unintended pregnancy was defined as women who had an unwanted or mistimed pregnancy. This measure, too, is weak. Women were asked if at the time they became pregnant they wanted to become pregnant then, or wait until later, or wanted to have no more children. Since the question was asked retrospectively, responses may be biased. For example, when a woman is sitting with a baby in her arms, whom she loves, she may not respond that the pregnancy was unintended, even if in actuality it was not intended. Moreover, we group women who wished to postpone pregnancy and women who wished to have no more children into the 'unintended pregnancy' group. In actuality, pregnancy intention is a fluid measure, not simply a yes/no answer.

3. Covariates

Study covariates include woman's age at the time of the survey, number of living children, educational attainment, wealth quintile, and urban/rural residence. Age and number of living children are included in the analysis as continuous variables. The standardized education variable is recoded into a three-category variable: none, primary, and secondary or higher. A standardized household wealth index was calculated based on reported possessions of a range of items and goods, and building structure. The wealth variable across the country surveys can be influenced by shifts in the types of assets used to develop the wealth score.[1]

4. Statistical Analysis

Bivariate associations between the two dependent variable and the covariates were assessed using Wald Chi-squared analysis and a 2-tailed significance level with a *p*-value <0.10 for categorical variables. For continuous variables an independent t-test was employed for comparing group means. Multivariate logistic regression models were used to estimate the relationships between explanatory covariates and the dichotomous outcome variables. Odds ratios (OR), 95% confidence intervals (CI), and I-values were calculated. Standard errors were adjusted for survey sample design effect using the Taylor linearization approach. All analyses were conducted using STATA 12.[2]

Results

Table 2 presents the weighted means and distributions of respondent socioeconomic and demographic characteristics. The mean age of respondents ranged from 25.0 years in Azerbaijan to 28.2 years in Morocco. The mean number of children born to respondents ranged from 1.8 to 3.4 children across the six countries. The majority of respondents in the Philippines (74.5%) and Azerbaijan (97.2%) have secondary or higher levels of education while the majority of respondents living in Morocco have no education (60.8%). Respondents across the six countries tended to belong to lower wealth quintiles. There is a fairly even distribution of respondents living in urban and rural areas in all countries except the DRC where the majority of respondents lived in rural areas (61.8%).

Table 2: Weighted Distributions and Means of Respondents by Socioeconomic and Demographic Characteristics

	Azerbaijan 2006		Bolivia 2008		Cameroon 2011		DRC 2007		Morocco 2003		Philippines 2008	
	(n=766)		(n=2397)		(n=3654)		(n=2860)		(n=1876)		(n=1909)	
	Age											
Mean (range)	25.0	(15-49)	27.6	(15-49)	26.8	(15-49)	26.9	(15-49)	28.2	(15-49)	27.9	(15-49)
	# of living children											
Mean (range)	1.8	(0-10)	3.0	(0-11)	3.4	(0-10)	3.4	(0-16)	2.7	(0-13)	2.9	(1-13)
	Education (%)											
None	2.8	(22)	4.9	(118)	29.4	(1073)	23.2	(664)	60.8	(1140)	25.5	(486)
Primary			51.4	(1231)	38.8	(1418)	43.8	(1253)	18.8	(354)		
Secondary/ Higher	97.2	(758)	43.7	(1048)	31.8	(1163)	33.0	(943)	20.4	(382)	74.5	(1423)
	Wealth Index (%)											
Lowest	17.6	(137)	24.6	(590)	24.4	(892)	20.0	(572)	24.9	(467)	26.7	(510)
Second	23.5	(184)	20.5	(492)	21.8	(796)	23.4	(670)	23.2	(435)	23.8	(454)
Middle	21.2	(165)	21.2	(507)	19.4	(710)	21.2	(605)	20.9	(393)	19.3	(369)
Fourth	22.3	(174)	20.1	(482)	18.2	(666)	20.7	(592)	14.9	(280)	17.4	(332)
Highest	15.4	(120)	13.6	(326)	16.2	(590)	14.7	(421)	16.1	(301)	12.8	(244)
	Residence (%)											
Rural	49.9	(389)	56.5	(1354)	58.2	(2128)	61.8	(1768)	48.5	(910)	46.3	(884)
Urban	50.1	(391)	43.5	(1043)	41.8	(1525)	38.2	(1092)	51.5	(966)	53.7	(1025)

The mean age of respondents who correctly responded to the fertility awareness question was slightly older than the mean age of women who have incorrect knowledge (Table 3). This difference in mean age is statistically significant in Morocco, Azerbaijan, and Cameroon. In all countries but the DRC and Azerbaijan, the mean number of living children among women with fertility awareness was lower than among women who incorrectly responded to the fertility awareness questions. As women's education increased their fertility awareness also increased across all six countries. Women in urban areas were more likely to have fertility awareness than women in rural areas in Morocco and Azerbaijan.

Table 3: Fertility Awareness by Background Characteristics among Women Currently Pregnant and Pregnant Within the Past 12 Month

	Azerbaijan 2006			Bolivia 2008			Cameroon 2011			DRC 2007			Morocco 2003			Philippines 2008		
	Unaware	Aware	Total	Unaware	Aware	Total	Unaware	Aware	Total	Unaware	Aware	Total	Unaware	Aware	Total	Unaware	Aware	Total
Age	24.7	25.7†	780	27.6	27.6	2397	26.6	27.6*	3654	26.7	27.3	2860	27.9	28.6†	1876	27.9	28.1	1909
# of living children	1.5	1.6	780	3.2	2.6*	2397	3.7	3.1*	3654	3.6	3.5	2860	2.7	2.3*	1876	2.8	2.5*	1909
	Education																	
None	78.3	21.7	22	90.3	9.7	118	84.2	15.8*	1073	71.4	28.6*	118	75.3	24.7*	1140	77.3	22.7*	486
Primary				73.3	26.7	1231	79.8	20.2	1418	64.8	35.2	1231	58.5	41.5	354			
Secondary /higher	67.7	32.3	758	51.5	48.5	1048	52.3	47.7	1163	44.5	55.5	1048	23.2	76.8	382	62.5	37.5	1423
	Wealth Index																	
Lowest	82.6	17.4*	137	77.6	22.4	590	87.4	12.6*	892	70. 9	29.1*	590	76.2	23.8*	467	75.2	24.8*	510
Second	79.2	20.8	184	65.8	34.2	492	76.6	23.4	796	61.3	38.7	492	75.7	24.3	435	72.7	27.3	454
Middle	67.9	32.1	165	68.1	31.9	507	76.1	23.9	710	61.5	38.5	507	60.7	39.3	393	64.4	35.6	369
Fourth	59.2	40.8	174	58.3	41.7	482	63.8	36.2	666	59.3	40.7	482	52.2	47.8	280	57.4	42.6	332
Highest	47.0	53.0	120	43.5	56.5	326	49.0	51.0	590	39.4	60.6	326	28.0	72.0	301	50.2	49.8	244
	Residence																	
Rural	79.4	20.6*	391	58.4	41.6	1354	62.3	37.7*	2128	48.2	51.8*	1354	73.1	26.9*	966	69.7	30.3	1025
Urban	56.5	43.5	389	72.7	27.3	1043	79.5	20.5	1525	66.6	33.4	1043	49.2	50.8	910	62.2	37.8	884

* significance at $p<0.00$; † significance at $p<0.05$; ^ significance at $p<0.10$

The associations between the intendedness of the last pregnancy and respondent characteristics are shown in Table 4. The mean age of women who intended their current or last pregnancy was lower compared to those who had an unintended pregnancy in all countries. The difference in mean age was statistically significant in all countries except Azerbaijan. There was a statistically significant difference in mean number of living children among women whose last pregnancy was intended, compared to those who had an unintended pregnancy in all six countries. Women whose last pregnancy was intended had on average fewer children. In the majority of countries as women's education increased, the probability that their last pregnancy was intended also increased. In the DRC the inverse relationship was observed. While the wealth quintile covariate was statistically significant in the majority of countries, a relatively even distribution of pregnancy intention was observed by wealth quintile. Living in rural areas had a statistically significant association with having an intended pregnancy in Bolivia.

Table 5 shows the adjusted odds ratios, 95% confidence intervals, and *p*-values of fertility awareness associated with respondent background. The odds of correct fertility awareness increased for every one year increase in age by 2% in the Philippines (OR: 1.02; *p*-value<0.10), 3% in Bolivia (OR: 1.03; *p*-value<0.05), and 7% in Cameroon (OR: 1.07; *p*-value<0.00). Fertility awareness decreases by 7% in Bolivia (OR: 0.93, *p*-value <0.10) and 14% in Cameroon (OR: 0.86; p-value<0.00) for every increase in the number of living children. In all six countries except Azerbaijan, women with secondary or higher education were more likely to have fertility awareness compared to women with little or no education.[*] The magnitude of the association was very high in Bolivia and Morocco where the odds ratio is 6.66 (*p*-value<0.00) and 6.49 (*p*-value<0.00), respectively. In addition, respondents in these two countries with primary education were more likely to have fertility awareness than women with no education. There was a clear linear association of fertility awareness and wealth in the Philippines, Morocco, Azerbaijan and Cameroon. For example, in the Philippines the odds of correct fertility awareness increased from 1.36 to 1.73 to 2.23 for middle to fourth to highest wealth quintile. In Azerbaijan, women residing in urban areas were 1.8 times more likely to have correct fertility awareness than women residing in rural areas (OR: 1.80; *p*-value <0.00).

[*] The comparison group in the Philippines is women with no or with primary level education

Table 4: Pregnancy Intention by Background Characteristics among Women Currently Pregnant and Pregnant Within the Past 12 Month

	Azerbaijan 2006			Bolivia 2008			Cameroon 2011			DRC 2007			Morocco 2003			Philippines 2008		
	Unintended	Intended	Total	Unintended	Intended	Total	Unintended	Intended	Total	Unintended	Intended	Total	Unintended	Intended	Total	Unintended	Intended	Total
Age	25.7	24.8	780	28.1	26.9*	2398	27.4	26.7†	3654	27.4	26.7†	2860	30.5	27.1*	1876	28.7	27.4*	1909
# of living children	2.0	1.4*	780	3.5	2.0*	2398	4.1	3.3*	3654	4.0	3.3*	2860	3.6	2.0*	1876	3.4	2.2*	1909
	Education																	
None	38.9	61.1^	22	75.8	24.2*	118	18.6	81.4*	1073	25.9	74.1*	118	34.7	65.3†	1140	41.6	58.4	486
Primary				71.2	28.8	1231	30.3	69.7	1418	33.3	66.7	1231	28.4	71.6	354			
Secondary /higher	18.8	81.2	758	51.2	48.7	1048	27.6	72.4	1163	42.4	57.6	1048	27.6	72.4	382	39.7	60.3	1423
	Wealth Index																	
Lowest	31.6	68.4†	137	78.0	22.0*	590	23.7	76.3*	892	29.3	70.7†	590	30.7	69.3	467	40.8	59.2†	510
Second	14.1	85.9	184	66.5	33.5	492	24.5	75.5	796	30.5	69.5	492	35.0	65.0	435	46.0	54.0	454
Middle	17.4	82.6	165	62.8	37.2	507	27.3	72.7	710	37.9	62.1	507	33.5	66.5	393	40.4	59.6	369
Fourth	20.8	79.2	174	53.8	46.2	482	32.4	67.6	666	34.8	65.2	482	32.8	67.2	280	35.5	64.5	332
Highest	13.7	86.3	120	42.5	57.5	326	22.6	77.4	590	43.3	56.7	326	27.4	72.6	301	34.1	65.9	244
	Residence																	
Rural	21.1	78.9	391	55.4	44.5*	1354	24.9	75.1	2128	37.5	62.5	1354	33.5	66.5	966	39.2	60.8	1025
Urban	17.5	82.5	389	72.2	27.8	1043	27.5	72.5	1525	32.8	67.2	1043	30.7	69.3	910	41.0	59.0	884

* significance at p<0.00; † significance at p<0.05; ^ significance at p<0.10

Table 5: Adjusted Odds Ratio of Fertility Awareness by Background Characteristics among Women Currently Pregnant and Pregnant Within the Past 12 Month

	Azerbaijan 2006		Bolivia 2008		Cameroon 2011		DRC 2007		Morocco 2003		Philippines 2008	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Age	1.03	(0.99- 1.07)	1.03†	(1.00- 1.05)	1.07*	(1.05- 1.10)	1.01	(0.99- 1.04)	1.01	(0.99- 1.03)	1.02^	(1.00- 1.04)
# of living children	1.11	(0.94- 1.32)	0.93^	(0.86- 1.01)	0.86*	(0.80- 0.93)	0.99	(0.92- 1.07)	1.02	(0.95- 1.09)	0.96	(0.90- 1.02)
None	ref		ref		ref		ref		ref		ref	
Primary			3.34*	(1.51- 7.37)	1.00	(0.73- 1.39)	1.24	(0.87- 1.76)	1.79*	(1.36- 2.35)		
Secondary /higher	0.81	(0.20- 3.37)	6.66*	(2.90- 15.3)	2.56*	(1.81- 3.61)	2.35*	(1.38- 3.98)	6.49*	(4.58- 9.20)	1.52*	(1.16- 2.01)
	Wealth Index											
Lowest	ref		ref		ref		ref		ref		ref	
Second	1.34	(0.68- 2.64)	1.45^	(0.96- 2.18)	1.90*	(1.28- 2.82)	1.54*	(1.08- 2.19)	0.93	(0.67- 1.28)	0.97	(0.70- 1.35)
Middle	1.89*	(1.03- 3.47)	1.10	(0.65- 1.85)	1.78*	(1.21- 2.60)	1.28	(0.86- 1.89)	1.63*	(1.06- 2.51)	1.36^	(0.96- 1.91)
Fourth	2.48*	(2.01- 7.09)	1.30	(0.74- 2.29)	2.63*	(1.68- 4.11)	1.02	(0.58- 1.80)	1.82*	(1.04- 3.16)	1.73*	(1.21- 2.48)
Highest	3.78*	(1.22- 2.67)	1.90*	(1.05- 3.46)	3.53*	(2.17- 5.74)	1.53	(0.75- 3.11)	3.59*	(2.00- 6.44)	2.23*	(1.48- 3.37)
Rural	ref		ref		ref		ref		ref		ref	
Urban	1.80*	(1.22- 2.67)	1.08	(0.72- 1.63)	0.88	(0.67- 1.15)	1.61	(0.86- 2.99)	0.81	(0.57- 1.15)	1.00	(0.78- 1.28)

* significance at p<0.00; † significance at p<0.05; ^ significance at p<0.10

Table 6 presents the adjusted odds ratios, 95% confidence intervals and p-values of pregnancy intention by respondent background characteristics. Pregnancy intention increased significantly with every one year increase in respondent age. This corresponds to a 4% increase in the Philippines (OR: 1.04; p-value<0.00), 6% increase in the DRC (OR: 1.06; p-value<0.00), 8% increase in Bolivia (OR: 1.08; p-value<0.00), and a 6% increase in Cameroon (OR: 1.06; p-value<0.00). Across all six countries, the intendedness of current or recent pregnancy decreased significantly for every unit increase in the number of living children – the pregnancy of women who already had more children was less likely to be intended than women with fewer children. Women with higher levels of education were less likely to have an intended pregnancy where the odds of pregnancy intention decreased among women with secondary or higher education compared to women with no education in the Philippines (OR: 0.75; p-value<0.05), DRC (OR: 0.47; p-value<0.00), and Cameroon (OR: 0.38; p-value<0.00). There were several significant associations of pregnancy intention and wealth in the Philippines, Bolivia, and Azerbaijan but no consistent pattern emerged. In terms of residence, in Bolivia respondents residing in urban areas were 45% less likely to have an intended pregnancy (OR: 0.55; p-value<0.05).

Finally, Table 7 presents the adjusted odds ratios, 95% confidence intervals, and p-values of pregnancy intention associated with fertility awareness. Women with fertility awareness were more likely to have an intended pregnancy in the Philippines, DRC, Bolivia, Azerbaijan, and Cameroon, but this association was statistically significant only in Cameroon where women were 40% (OR: 1.40; p-value<0.00) more likely to have an intended pregnancy if they had fertility awareness. The opposite relationship was observed in the DRC and Morocco (statistically significant only in Morocco) where women with fertility awareness were more likely to have an unintended pregnancy.

Table 6: Adjusted Odds Ratio of Pregnancy Intention by Background Characteristics among Women Currently Pregnant and Pregnant Within the Past 12 Month

	Azerbaijan 2006			Bolivia 2008			DRC 2007			Cameroon 2011			Morocco 2003			Philippines 2008		
	Odds Ratio	95% Confidence Interval		Odds Ratio	95% Confidence Interval		Odds Ratio	95% Confidence Interval		Odds Ratio	95% Confidence Interval		Odds Ratio	95% Confidence Interval		Odds Ratio	95% Confidence Interval	
Age	1.03	(0.96-	1.11)	1.08*	(1.06-	1.10)	1.06*	(1.03-	1.09)	1.06*	(1.04-	1.09)	1.01	(0.98-	1.03)	1.04*	(1.02-	1.07)
# of living children	0.51*	(0.39-	0.67)	0.55*	(0.50-	0.61)	0.75*	(0.69-	0.82)	0.72*	(0.68-	0.77)	0.59*	(0.53	0.65)	0.69*	(0.64-	0.75)
	Education																	
None	ref			ref			ref			ref			ref			ref		
Primary				0.82	(0.45-	1.47)	0.76	(0.52-	1.11)	0.45*	(0.35-	0.57)	0.95	(0.70-	1.29)			
Secondary /higher	2.11	(0.59-	7.45)	0.92	(0.49-	1.72)	0.47*	(0.32-	0.71)	0.38*	(0.28-	0.51)	0.83	(0.57-	1.20)	0.75†	(0.58-	0.97)
	Wealth Index																	
Lowest	ref			ref			ref			ref			ref			ref		
Second	2.39†	(1.32-	4.20)	1.47†	(1.02-	2.12)	1.00	(0.71-	1.40)	1.16	(0.90-	1.50-)	0.89	(0.66-	1.19)	0.69†	(0.53-	0.90)
Middle	1.75	(0.86-	3.34)	1.39	(0.84-	2.30)	0.76	(0.51-	1.12)	1.16	(0.81-	1.66)	0.94	(0.61-	1.45)	0.73^	(0.53-	1.00)
Fourth	1.28	(0.67-	2.45)	1.56	(0.88-	2.76)	0.96	(0.62-	1.49)	0.91	(0.62-	1.33)	1.10	(0.66-	1.83)	0.85	(0.60-	1.19)
Highest	1.99^	(0.89-	4.41)	1.96†	(1.07-	3.58)	0.69	(0.38-	1.25)	1.41	(0.90-	2.19)	1.48	(0.82-	2.67)	0.82	(0.55-	1.23)
	Residence																	
Rural	ref			ref			ref			ref			ref			ref		
Urban	1.03	(0.62-	1.72)	1.03	(0.68-	1.54)	0.89	(0.65-	1.23)	1.14	(0.73-	1.78)	0.55†	(0.38-	0.80)	1.03	(0.82-	1.30)

* significance at p<0.00; † significance at p<0.05; ^ significance at p<0.10

Table 7: Adjusted Odds Ratio of Pregnancy Intention by Fertility Awareness & Background Characteristics among Women Currently Pregnant and Pregnant Within the Past 12 Month

	Azerbaijan 2006		Bolivia 2008		Cameroon 2011		DRC 2007		Morocco 2003		Philippines 2008	
	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval	Odds Ratio	95% Confidence Interval
Fertility awareness	1.06	(0.65- 1.73)	1.14	(0.90- 1.46)	1.40*	(1.15- 1.72)	0.95	(0.67- 1.33)	0.73†	(0.57- 0.93)	1.05	(0.83- 1.31)
Age	1.03	(0.96- 1.11)	1.08*	(1.06- 1.10)	1.06*	(1.03- 1.08)	1.06*	(1.03- 1.09)	1.01	(0.99- 1.04)	1.04*	(1.02- 1.07)
# of living children	0.51*	(0.39- 0.67)	0.55*	(0.50- 0.61)	0.73*	(0.68- 0.78)	0.75*	(0.69- 0.82)	0.59*	(0.53- 0.65)	0.69*	(0.64- 0.75)
	Education											
None	ref		ref		ref		ref		ref		ref	
Primary			0.90	(0.44- 1.44)	0.45*	(0.35- 0.57)	0.76	(0.52- 1.12)	0.99	(0.73- 1.35)		
Secondary /higher	2.12	(0.60- 7.46)	0.88	(0.47- 1.67)	0.36*	(0.27- 0.48)	0.48*	(0.31- 0.74)	0.94	(0.63- 1.40)	0.75†	(0.58- 0.96)
	Wealth Index											
Lowest	ref		ref		ref		ref		ref		ref	
Second	2.35†	(1.31- 4.21)	1.46†	(1.01- 2.10)	1.13	(0.88- 1.46)	1.00	(0.71- 1.41)	0.88	(0.65- 1.19)	0.70†	(0.53- 0.90)
Middle	1.73	(0.85- 3.54)	1.38	(0.84- 2.29)	1.14	(0.80- 1.62)	0.76	(0.51- 1.13)	0.98	(0.63- 1.52)	0.73^	(0.53- 1.00)
Fourth	1.27	(0.66- 2.43)	1.54	(0.88- 2.73)	0.86	(0.59- 1.26)	0.96	(0.62- 1.49)	1.15	(0.69- 1.92)	0.84	(0.60- 1.18)
Highest	1.96	(0.84- 4.53)	1.92†	(1.05- 3.50)	1.31	(0.85- 2.04)	0.70	(0.39- 1.26)	1.61	(0.89- 2.95)	0.82	(0.54- 1.23)
	Residence											
Rural	ref		ref		ref		ref		ref		ref	
Urban	1.02	(0.61- 1.70)	1.03	(0.69- 1.54)	0.90	(0.66- 1.24)	1.15	(0.74- 1.79)	0.54†	(0.37- 0.79)	1.03	(0.82- 1.30)

* significance at p<0.00; † significance at p<0.05; ^ significance at p<0.10

Conclusion

Our results show that more educated women, and wealthier women, are more likely to have fertility awareness. While this association is not always statistically significant, the relationship is consistently in the same direction and holds true in the multivariate analysis in all countries except Azerbaijan, which might be explained by the highly educated sample of women in Azerbaijan (92.7% have secondary or higher levels of education). In terms of pregnancy intention, women with higher levels of education are more likely to have an intended pregnancy in the Philippines, Bolivia, Morocco and Azerbaijan. In the two African countries of DRC and Cameroon, the relationship is reversed, and women with no education are more likely to have an intended pregnancy.

The multivariate analysis of fertility awareness indicates that as age increases fertility awareness also increases while controlling for other background characteristics, though this association was statistically significant only in the Philippines, Bolivia, and Cameroon. As the number of living children increases, fertility awareness decreases in Bolivia and Cameroon, suggesting that a previous birth experience does not necessarily influence fertility awareness. There appears to be linear increase in fertility awareness as wealth quintile increases in the Philippines, Morocco, Azerbaijan and Cameroon. Urban and rural residential differences are not a factor in fertility awareness except in Azerbaijan.

The multivariate analysis of pregnancy intention indicates that older women, and women with fewer children, are more likely to have an intended pregnancy. As expected, fertility awareness increases the likelihood that the pregnancy was intended in four of the countries. However, this relationship was only statistically significant in Cameroon, and the effect was reversed in Morocco and DRC. Several possible explanations for this result may be considered:

- First, the definition we used for fertility awareness (the only one available in the DHS data) is weak, and may not adequately capture respondent's actual understanding of when in the cycle a woman can become pregnant. The fact that there is relatively little change between the odds ratios presented in Table 6 and Table 7 suggests that this variable may not vary enough to be a strong correlate of pregnancy intention. Moreover, even women who understand when in a cycle a woman is more likely to become pregnant may not necessarily know how to apply this information to their own bodies, and do not translate this knowledge into the actions required to use a family planning method or to avoid unprotected sex on the days they are fertile.
- Second, factors other than the woman's own knowledge and intention may influence women's decision. Several examples are:
    - Ideal family size – women who wish to have several more children in the future, may not try to avoid pregnancy, even if they would prefer to postpone it.
    - Access to family planning – a woman who would like to use a method to avoid pregnancy may have an unintended pregnancy, regardless of her fertility awareness, if she does not have access to contraceptive methods, or to a method of her choice.
    - Lack of concordance between husbands' and wives' fertility intentions – the woman may wish to avoid a pregnancy, but her husband may wish to have more children now.

- Lack of empowerment to use family planning – women with fertility awareness who wish to use a family planning method may not do so if they feel opposition in their family or their community.
- Breastfeeding status – women often erroneously believe that they cannot become pregnant just because they are breastfeeding.
- Infrequent sex – women often think that they cannot become pregnant because they have sex infrequently. If they had unprotected sex (on rare occasions) for several cycles and did not become pregnant, they think they are infertile, and do not use a method.

Further analysis is needed to account for some of these factors. The DHS includes several questions that may serve as proxy for individual and community characteristics, including ideal family size of the woman and her husband, unmet need for family planning, decision making in the household (whether the woman or her husband make certain household decisions), and breastfeeding status at the time the woman became pregnant unintentionally.

Further analysis of DHS data, controlling for the effect of these variables on pregnancy intendedness, may shed more light on the relationship between having fertility awareness and having an unintended pregnancy. However, to really get into the relationship between having fertility awareness and having unplanned pregnancy, studies are needed that would have a better definition of fertility awareness and of pregnancy intendedness, that more readily show how having suitable, life-stage appropriate information about various aspect of fertility can influence women's behavior.

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